

An apparatus and method of using the apparatus to prepare a biocompatible biodegradable matrix capable of supporting cells to form an implantable or engraftable surgical device. A matrix-forming fluid is contained within a chamber defined by top and bottom surfaces of a thermally conductive material and spacers defining the thickness of the matrix. The chamber is then cooled to freeze the solution at a controlled rate, resulting in a matrix with a desired and uniform thickness having symmetric and uniform reticulations. The apparatus and method reproducibly forms such a matrix, which may be populated with cells for transplantation and engraftment into a wound.